

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 5-9, 11, 36-41, 43, and 45-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer, US Patent 5,422,139 in view of Muller et al, US Patent 6,537,418.

Fischer teaches a processing apparatus that includes: walls enclosing a process chamber 14; a susceptor for supporting a wafer (substrate) 10; a first/second exhaust conduit 18 radially outward from the wafer susceptor in fluid communication with the chamber and adapted to receive a first/second flow of gas passing substantially vertically from a gas distribution showerhead to an upper surface of the wafer and radially across the upper surface of the wafer to the first/second exhaust conduit; and a processing gas source A in fluid communication with the chamber through a showerhead 13, which includes a first channel 12 in fluid communication with the processing gas source and with apertures 3, 4 distributed over the lower surface of the showerhead in the plane defined by the lower surface of the showerhead, and a second/first channel separate from the first/second channel and in fluid communication with a second/first exhaust conduit and with exhaust apertures 5 distributed over the lower surface of the showerhead wherein the second/first exhaust conduit is adapted to

receive a second/first flow of gas passing substantially vertically from the first channel apertures 3, 4 to an upper surface of the wafer and substantially vertically through the second channel apertures 5, the second/first flow of gas being independent of the first/second flow of gas; and the first exhaust conduit and the second exhaust conduit share a common exhaust line 22 and pump. The apertures define a first area and the exhaust apertures define a second area and the ratio of the first area to the second area is substantially constant as a function of radial distance from the center of the gas distribution showerhead. (Entire document, specifically, figures 4, 7a, 8, and 9)

Fischer differs from the present in that Fischer does not teach that the ratio of the first area to the second area varies as a function of the radial distance from the center of the gas distribution showerhead.

Muller et al teaches a gas distribution plate 60 that includes a first channel 72 in fluid communication with the processing gas source and with apertures 66, 66a distributed over a lower planar surface of the gas distribution plate, the apertures define a first area; and a second channel separate from the first channel and in fluid communication with a second exhaust conduit and with exhaust apertures 69, 69a distributed over the lower surface of the gas distribution plate. The second apertures 69, 69a define a second area and a ratio of the first area to the second area varies as a function of the radial distance from the center of the gas distribution plate. (The ratio 66/69 at the center decreases as the radial distance increase from the center to the ratio 66a/69a at the edge of the wafer.) Muller et al also teaches:

"It is further contemplated that apertures 66 and channels 69 can have

predetermined areas at predetermined locations on GDP 60 to adjust the flow at to accommodate different load conditions on the wafer. By creating a condition in which load conditions are accounted for in conjunction with uniform gas concentrations, an improved etching process is realized.”

The motivation for varying the ratio of the first area to the second area varies as a function of the radial distance from the center of the gas distribution showerhead of Fischer as taught by Muller et al is to optimize the flow at to accommodate different loads conditions on the wafer to improved the etching process.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the ratio of the first area to the second area as a function of the radial distance from the center of the gas distribution showerhead in order to optimize the flow through the processing chamber of Fischer as taught by Muller et al.

3. Claims 10, 12, 42, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer, US Patent 5,422,139, and Muller et al, US Patent 6,537,418 B1, as applied to claims 1, 5-9, 11, 36-41, 43, and 45-48 above, and further in view of Adomaitis et al, WO 02/08487.

Fischer and Muller et al differs from the present in that they do not teach valves in the first and second conduits are connected to the common foreline via a first and second valve, or that the first and second conduits are connected to separate vacuum pumps.

Adomaitis et al was discussed above.

The motivation for adding the valves of Adomaitis et al to the first and second exhaust conduits of Fischer is to control the flow of gases through the exhaust conduits.

The motivation for replacing the single pump of Fischer and Muller et al with two pumps as taught by Adomaitis et al is to provide an alternate and equivalent means of exhausting the process gases. Multiple pumps allow the pumps to be specifically tailored to the flow requirements of each flow conduit.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add valves to the first and second exhaust conduits of Fischer and Muller et al, and replace the single pump of Fischer and Muller et al with two pumps as taught by Adomaitis et al.

Response to Arguments

4. Applicant's arguments filed February 15, 2008 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no suggestion to combine the references, the Examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation is found in Fischer (i.e. varying the infeed and draw off conditions), Muller et al (as

discussed above), and the knowledge is generally available to one of ordinary skill in the art.

In regard to the argument that the combination would change the principle of operation of the prior art, the Examiner disagrees. Changing the ratio of the holes changes the infeed and draw off conditions (i.e. flow rate) which, as noted by the Applicant, is recognized in Fischer (column 7 lines 17-22) as being a known way of varying the distribution effect. Thus, the combination does not destroy Fischer.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrie R. Lund whose telephone number is (571) 272-1437. The examiner can normally be reached on Monday-Thursday (10:00 am - 9:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jeffrie R. Lund/
Primary Examiner
Art Unit 1792

JRL
6/5/08